

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
AND  
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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## Flight

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## EDITORIAL COMMENT



### An Imperial Airship Service

GOOD deal has appeared in the daily newspapers recently on the subject of the projected—we call it projected, though suggested would probably be the better term—Imperial airship service. If we were to take seriously all we have read during the past week or ten days, we should begin to think that we are really on the eve of seeing such a service actually in being. But when we come to dissect all that has been said and written, we really cannot see that we have travelled much farther along the road to the consummation of what is the desire of all who have the future of commercial aviation at heart. Let us see to what it all amounts.

At the Imperial Conference of Dominion Prime Ministers it was suggested that an airship service for linking up the Empire should be established. Estimates were submitted which showed that an outlay of about £1,339,000 would be necessary to carry out an experimental service over a period of two years. Later it was thought that it might be done at a cost of a million pounds, and the proposal was put forward that of this the Mother Country should contribute £325,000, Australia and India £250,000 each, Africa £100,000, and New Zealand £75,000. Up to the present the only concrete offer is that of Australia, but it is said that contingent upon the other contributions being forthcoming a financial group is willing to find a further sum of 2½ millions to start a regular service to Egypt, South Africa, India, Australia and New Zealand, such service—which is to be fortnightly—not to be started until the expiration of a two years' experimental period. There seems to be a further contingent stipulation that the British and Dominion Governments must subsidise the service to the extent of £500,000 annually for a term of years. This subsidy it is proposed should be provided as to £250,000 by Great Britain and a further equal sum by the Dominions. Mr. Ashbolt, the Agent-General for Tasmania, who has worked hard and unceasingly in favour of the scheme, says that if all these conditions are fulfilled he can get all the money he wants for the service. He is optimistic enough to think that this country will be willing to find

## DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.

Jan. 5 ....	Lecture, "Specialised Aircraft," by Wing-Com. W. D. Beatty, before R.Ae.S.
Jan. 19 ....	Lecture, "Aeroplane Installation," by Brig.-Gen. R. K. Bagnall-Wild, before R.Ae.S.
Feb. 2 ....	Lecture, "Radiological Research," by Dr. V. E. Pullin, before R.Ae.S.
Feb. 7 & 8	Second Air Conference at Guildhall
Feb. 16 ....	Lecture, "Methods of Instruction in Aeroplane Flying," by Sq.-Leader Portal, before R.Ae.S.
Mar. 2. ....	Lecture, "Testing Aircraft to Destruction," by W. D. Douglas, before R.Ae.S.
Mar. 26-	
April 2	Nice Meeting
Mar. 30 ....	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
July 6-20	French Gliding Competition
Sept. 2 ....	Gordon-Bennett Balloon Race, Geneva
Sept. ....	Tyrrhenian Cup, Italy
Sept. ....	Italian Grand Prix

any reasonable balance of the amount required to complete the initial £1,000,000 after definite replies have been received from the Dominion Governments.

Well, it may be so, but we confess that when we regard the past and present policy of the Government towards commercial aviation, whether concerning aeroplane or airship, we are not encouraged to hope too much. Naturally, we hope as sincerely as any that the British Government will agree to find any reasonable sum of money to assist in opening up a service which cannot but be of inestimable value to Empire communications, but whether the hope has any justification in fact we frankly do not know. At any rate, it is cheering to know that the scheme for an Empire airship service is not as dead as we had supposed it to be, though we do think that those who have been telling us that the service is likely to be inaugurated with the British airships which are at present "rotting in their sheds" are unduly sanguine. Is it certain that the rotting process has not gone too far to be retrieved. Or that the dispersal of *personnel* and stores has not progressed to a point at which it would be true to say that there remains now no nucleus even of a practical service. We should really like to hear from the Air Ministry on this particular point.

#### Air Mails to the East

The Post Office seems at last to be awakening to the value of the speed of aerial transmission of mails. It has been officially notified that the fee for the transmission of letters by aerial post from Cairo to Baghdad has, by arrangement with the Air Ministry, been reduced from 1s. to 6d. per ounce. This arrangement commenced with the Christmas mails which left London on the 15th inst., and which, given favourable conditions, should be delivered in Baghdad on or about the 23rd.

There has been a steady growth in the use of the Cairo-Baghdad air mail service. On the 13th October the mail contained 57 letters. A month later the number was 172, and on the 1st December this number had increased to 354 letters. The average time of transmission by ordinary mail from London is 27 days. The air mails despatched from London during the past two months have reached Baghdad on an average in 12 days, and on three occasions out of five in 10 days or less. So that the time saved on this very important route averages over a fortnight, and sometimes approximates very closely to three weeks. And it must be borne in mind that this is not a mail service within the ordinary meaning of the term. That is to say, it is not a service run by a commercial firm for a profit and subject to contract penalties in case of delay or failure. On the contrary, it is an official service which is primarily operated for the conveyance of Government despatches, and is engaged in conveying ordinary mail matter simply as a matter of arrangement and for the sake of experiment. If it were a commercial service it would be run with more regularity, and the net saving in time would be even greater than it is.

We give every credit to the postal authorities for the use they are making of the facilities placed at their disposal by the Air Ministry, and cannot refrain from expressing the hope that the experience which is being gained on this route may lead them to look with a more favourable eye upon aerial

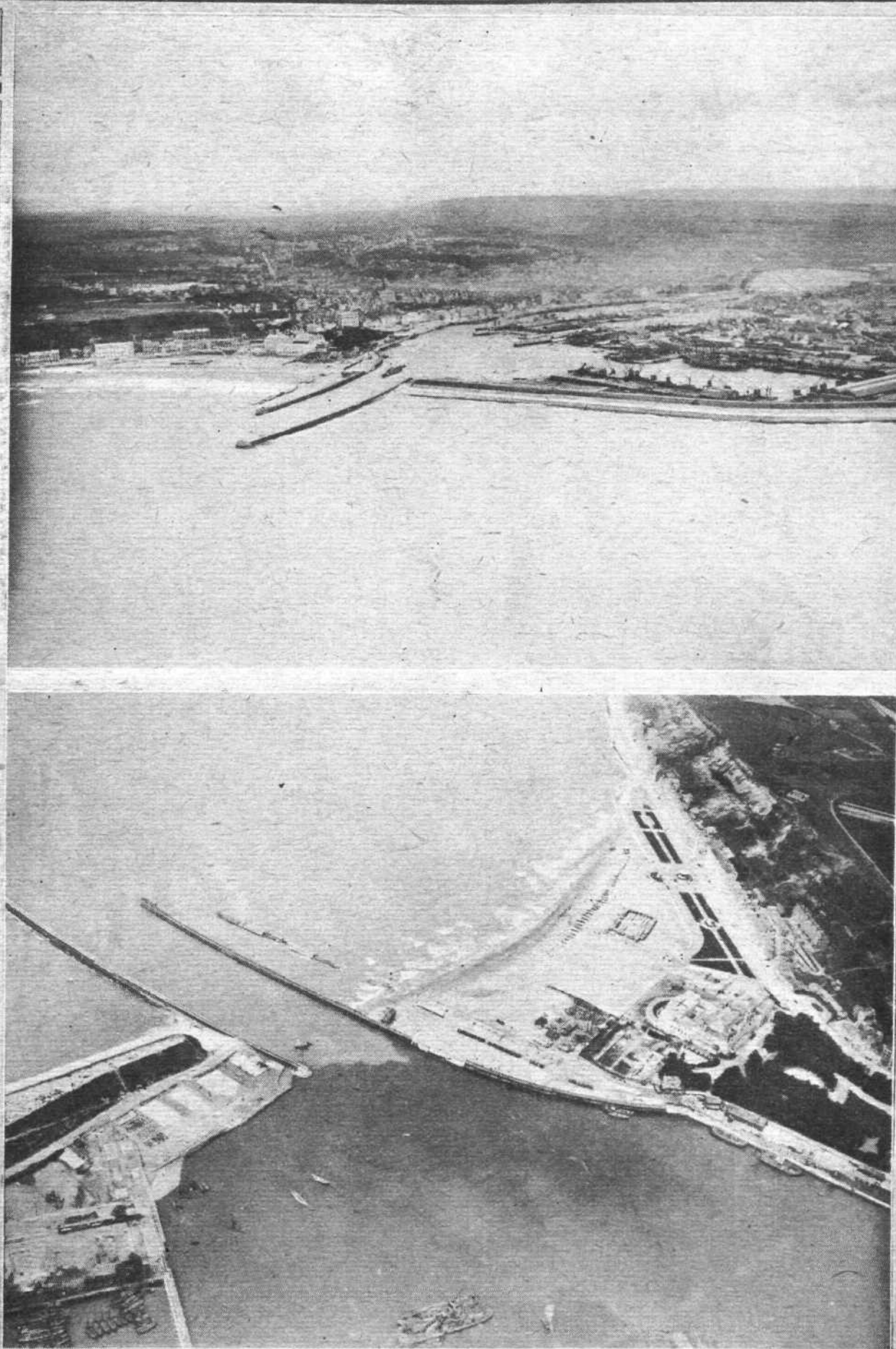
transport generally. The attitude which is usually adopted by the Postmaster-General is of "wait and see." Whenever a case is presented this attitude resolves itself into "get the service established and then we will see if anything can be done about mails. But for Heaven's sake don't say the Post Office has promised to do anything but give favourable consideration to the thing!" In other words, the official attitude towards air services in general is that of the ultra-careful father who says he will not allow his boy to enter the water until he has learnt to swim. It ought to be easy enough now for the postal authorities to make up their minds, and at least to say that where there is a *bona fide* intention to establish an aerial service a certain proportion of mail matter shall be carried, always provided the service complies with reasonable requirements. If only they would do that there would be an assurance of a certain amount of ready-made traffic, which would act as a strong incentive to commercial firms to risk capital in establishing services on routes where they are likely to prove serviceable to the public and remunerative to shareholders. Such an attitude would commit the Post Office to little, but it would have a most encouraging effect on commercial aviation.

#### Lighting the Airways

Before long it should be possible to carry on night air services between London and Paris with almost as great facility as they are now operated during the hours of daylight. The foundations of a new aerial lighthouse have been laid at the summit of Titsey Hill, near Woldingham, and within the next week or two the steel lighthouse tower will have been erected and the lights installed. Another and more powerful light is to be erected on high ground at Cranbrook, in Kent, which, when it is completed, will finish the chain of lights between London and the Kent coast. There is already a powerful light at Lympne and another at the terminal aerodrome at Croydon. The whole of the lighting scheme of the London-Paris airway is to be finished this winter, in readiness for the spring air traffic, and with its completion the stretch of airway between London and the coast will be the first in the world to be so illuminated. Pilots of night-flying machines will be in sight of at least one of the lights throughout the whole of the journey, and at times no less than three will be visible. The lights themselves are quite unmistakable in their character, as they will be visible as a brilliantly lighted triangle, impossible to mistake for anything else, at a distance of at least twenty miles.

This is only a step in the great work of lighting the world's airways. In the time to come, there will be chains of such lighthouses girdling the earth, and the airways will be even more effectually lighted than the world's seaboard. It must come because under existing conditions air transport is handicapped against its rivals by reason of the fact that without these guiding lights it can only operate by day. Night-flying for commercial purposes is merely a question of direction-finding, and until it is possible for the night pilot to be certain of his direction and his exact whereabouts, it is out of the question to successfully operate night service. The lighting of the airways, therefore, is a work that must be pushed along with all possible speed.





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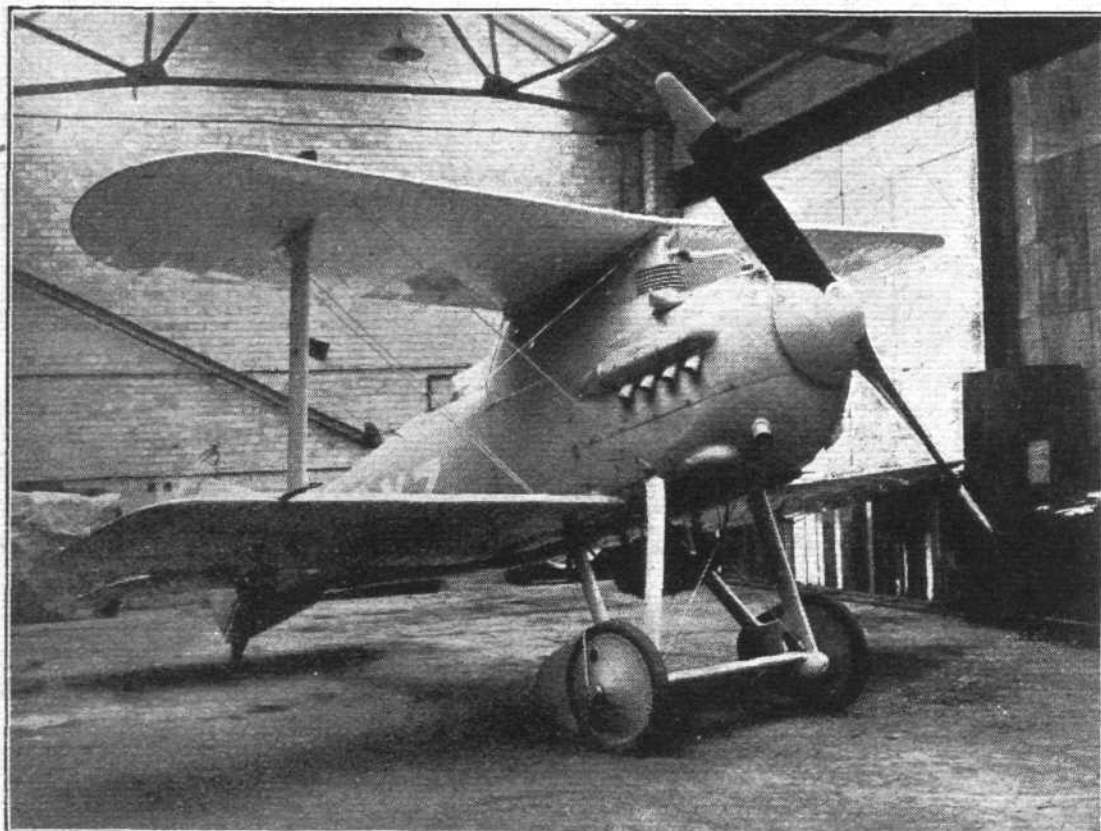
**LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE :**

No. 19.—*At top, Approaching Boulogne ; below, Boulogne Harbour.*

# MARS I's WONDERFUL PERFORMANCE AT MARTLESHAM 212 M.P.H.!

In our issue of last week it was mentioned that the Gloucestershire Aircraft Co.'s machine, Mars I, was ready for trials, and that these would take place as soon as weather conditions permitted. The tests have now been made, and with highly gratifying results. We said last week that we should be surprised if 190 m.p.h. was not exceeded. Over the speed course at Martlesham on December 19 Mr. J. H. James established a British record by flying at an average speed of 196.4 m.p.h. The previous British speed record was held by James's friend and partner, Mr. Tait-Cox, flying a

shire Aircraft Co., Mr. Folland and Mr. James on their wonderful achievement, as well as Messrs. Napiers, who have thus added another victory to the many already won by their famous "Lion" engine. It is a matter of the greatest importance to the prestige of British aviation that such a splendid performance should have been put up by an all-British machine, and it cannot fail to be of benefit to the aviation industry generally, which thus owes a debt of gratitude to the Gloucestershire Aircraft Co. for spending the money on producing such a wonderful machine. It is



The Mars I as it appeared in the Martlesham tests: Note the clean lines, and the manner in which the Napier "Lion" has been cowled in. Also the fairings behind the wheels.

British Nieuport "Goshawk," whose average speed was 166.5 m.p.h. Both machines were designed by Mr. H. P. Folland, now chief engineer and designer of the Gloucestershire Aircraft Co. of Cheltenham.

Over the flying kilometre James managed to beat the previous world's speed record, held by Sadi Lecoq with a speed of 206 m.p.h., by flying at the tremendous speed of 212 m.p.h. The report of the observers still has to be considered by the Royal Aero Club, and it will probably be some little time before the flight is homologated as a world's record. In the meantime we congratulate the Gloucester-

to be hoped that this firm will not be long in reaping a deserved reward for their enterprise.

It is of interest to mention briefly the outfit which contributed to this success. The machine is already well known to readers of this journal, and the same applies to the famous Napier "Lion" engine. It may be added, however, that the engine was burning "Shell" spirit, and lubricated with Wakefield oil. The magneto was a B.T.H., and the sparking plugs were the well-tried K.L.G. As mentioned in our issue of last week the machine is doped with Titanine. Our congratulations to everybody concerned.

## THE LONDON-CONTINENTAL SERVICES FLIGHTS BETWEEN DECEMBER 11 AND DECEMBER 17, INCLUSIVE

Route†	No. of flights*	No. of passengers	No. of flights carrying		No. of journeys completed†	Average flying time	Fastest time made by	Type and (in brackets) Number of each type flying
			Mails	Goods				
Croydon-Paris ...	5	14	3	3	4	h. m. 2 16	D.H. 18 G-EAWO (2h. 10m.)	D.H. 18 (1), G. (1), H.P. (1) Sp. (1), V. (1).
Paris-Croydon ...	2	7	0	1	0	—	—	D.H. 18 (1), H.P. (1).
Totals for week ...	7	21	3	4	4			

\* Not including "private" flights.

† Including certain journeys when stops were made en route.

‡ Including certain diverted journeys.

Av. = Avro. B. = Breguet. Br. = Bristol. Bt. = B.A.T. D.H.4 = De Havilland 4, D.H.9 (etc.).  
F. = Fokker. Fa. = Farman F.50. G. = Goliath Farman. H.P. = Handley Page. M. = Martinsyde. N. = Nieuport.  
P. = Potez. R. = Rumpler. Sa. = Salmson. Se. = S.E.5. Sp. = Spad. V. = Vickers Vimy. W. = Westland.





# THE · PARIS · AERO · SHOW · 1921

BY THE TECHNICAL EDITOR

(Continued from page 826.)

## ÉTABLISSEMENTS LIORÉ et OLIVIER

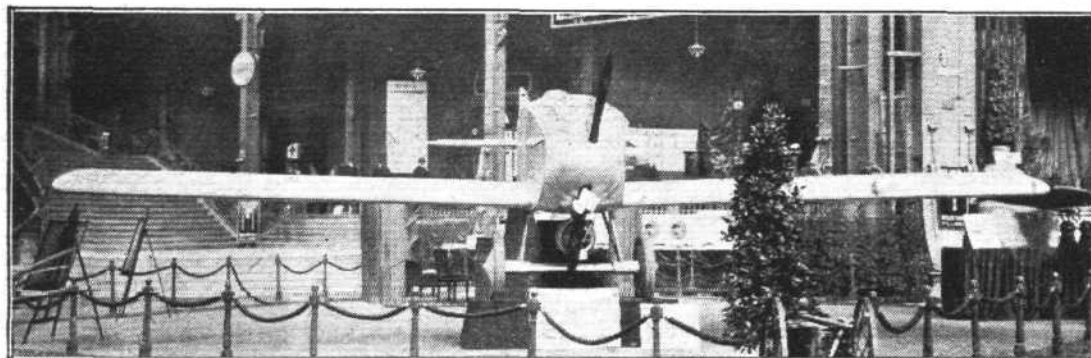
46, Rue de Villiers, Levallois-Perret

COMPARED with the exhibit of 1919, the machine shown at the present Paris show by Lioré et Olivier is of little interest. At the previous exhibition an interesting, although unconventional, three-engined flying boat was shown. This year the only exhibit is a small *monoplan de Chasse*, with Junkers type of wings placed at the lower corners of the *fuselage*.

## AEROPLANES MORANE-SAULNIER

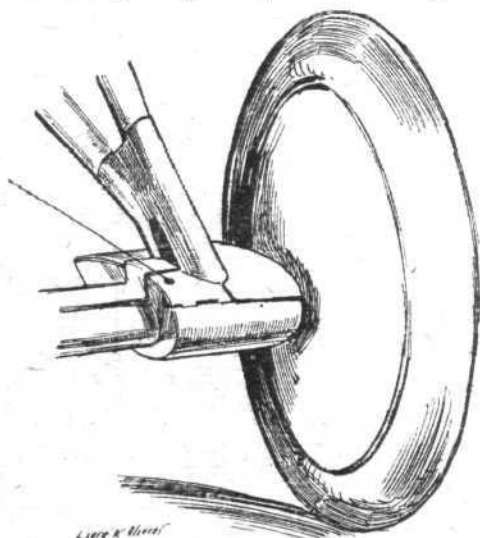
3, Rue Volta, Puteaux (Seine)

ALREADY before the War, Robert Morane and Raymond Saulnier were advocates of, and indeed manufactured nothing but, monoplanes. In view of the vogue which the monoplane appears to be enjoying at present, it is not, therefore, surprising that this firm is again represented solely by machines of this type, but it must be confessed that one had



On the Lioré et Olivier Stand: The "Leo 9" is an all-metal monoplane of the Junkers type. The wing section is the famous Schoukowsky aerofoil. "Flight" Copyright

The machine, which has been "étudié" by M. W. Margoulis, is of metal construction, but no information relating to details is available. The wing section is the famous Schoukowsky aerofoil. The *fuselage*, although streamlined most carefully, does not impress one as being of a very good shape aerodynamically, and the estimated performance of 300 km. (186 miles) per hour appears somewhat optimistic, even with the famous 300 h.p. Hispano-Suiza engine.



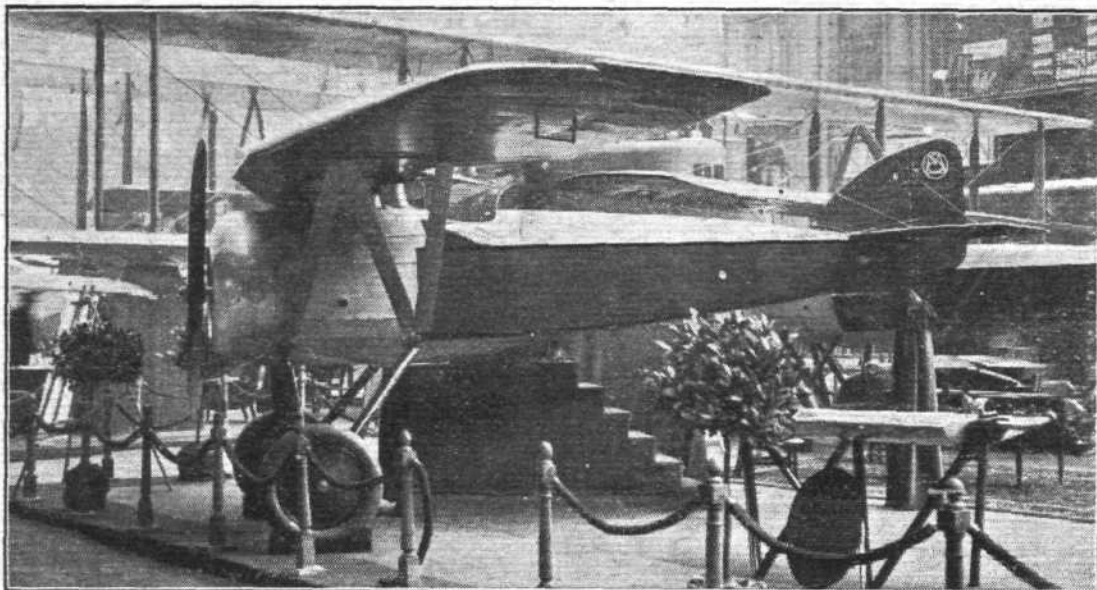
The Lioré et Olivier monoplane is built of metal throughout. Sketch shows streamline casing over shock absorbers.

expected something rather more interesting than the two parasol monoplanes which formed the M.-S. exhibit. It might have been expected that, during the two years which have elapsed since the last Show in the Grand Palais, such an old firm would have made more progress than that indicated on the stand. One believes, however, that it would be a fallacy to judge the firm on the two machines shown, as some much more interesting types are believed to be coming through the works at Puteaux.

One of the monoplanes shown was the well-known type A.R. two-seater parasol, with 80 h.p. Le Rhône engine, which has been exhibited before, and which, although it has many famous flights to its credit, is not a type that one expects to find at a Show in 1921.

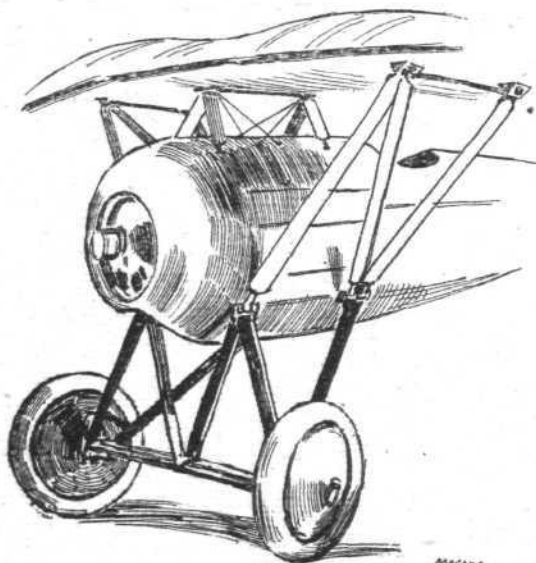
The second machine shown, although of a new type as far as this firm is concerned, has been seen in a somewhat similar form in Germany fairly early in the War, and is in any case, one is informed, more to be regarded as a flying model of a larger machine, a wind tunnel model of which is exhibited. The large machine is to be a two-seater fighter and reconnaissance machine with stationary engine, and the present machine has been built chiefly to test the wings under actual flying conditions. The main feature of the M.-S. type "AU" is the peculiar shape of the parasol cantilever wings. The leading edge is swept back considerably, and the wing, which is built in two halves, is further characterised by having its greatest depth at the points where attach the outwardly raked struts, tapering off in depth and chord to the tips, and in depth towards the centre.

One advantage of this arrangement is that the wing spars are more or less proportionate in depth to the bending moment at any point, and from the pilot's point of view the smaller wing depth is of advantage in obstructing the vision to a smaller extent. The machine shown has been flown, but we



The Morane-Saulnier type "A.U." has cantilever wings of rather unusual design.

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The Morane-Saulnier cantilever monoplane is really intended as a full-scale experiment for a much larger machine, which is exhibited in model form on the M.S. stand. The sketch shows the wing bracing.

are informed that few reliable data are available as yet, while various minor points still require modification before the machine is considered entirely *au point*. The fuselage is of standard type—that is to say, the same as that of the type "AS," while the wings are of the same span and area

as those of the type "AI." It has been found that fitting the new wings results in a higher maximum speed and a lower landing speed than those obtained with the ordinary thin wings, but no figures are available as to how great is the increase in the one and the decrease in the other.

#### NIEUPORT-ASTRA ET COMPAGNIE GÉNÉRALE TRANSAÉRIENNE

50, Boulevard Gallieni, Issy-les-Moulineaux

As a result of the recent combine, the Nieuport-Astra firm is now one of the most powerful groups in France, with a capital of 38,000,000 francs, and including among their products, aeroplanes, seaplanes, motor boats of all descriptions, and airships (Astra). Of aeroplanes three complete machines are shown, neither of which has the interest of novelty. One of them is the famous type "29C," a single-seater fighter, and probably the most beautiful machine of its type ever produced. It has a monocoque body of small cross-sectional area, and its Hispano-Suiza engine is neatly covered-in, with Lamblin radiators mounted on the under-carriage. The armament comprises two machine guns.

The second machine is the Nieuport-Delage monoplane racer, on which Kirsch won the Coupe Deutsch. It was on a similar machine that Sadi Lecointe crashed in that race, and looking at the diminutive wings, bearing in mind the terrific landing speed which they must necessitate, one cannot help marvelling that Sadi escaped with his life. However, we had the pleasure of a short chat with him on the stand, and he is apparently none the worse for his terrible experience. Two small scars are all that now testify to his "spill," and he has lost none of his *sang froid*, nor is his smile any less winning. Sadi is one of the most charming fellows one knows, and it is to be hoped that his proverbial good luck will never desert him.

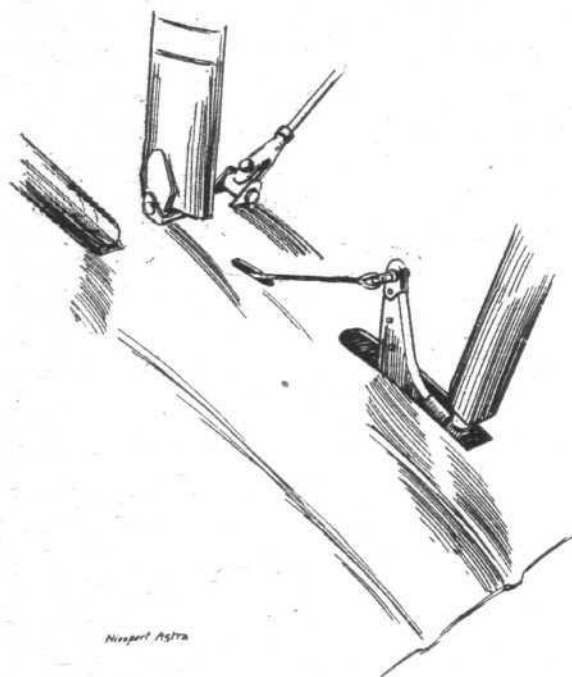


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TWO NIEUPORT-DELAGE MACHINES AT THE PARIS SHOW: On the left the well-known type "29 C 1," and on the right the Coupe Deutsch monoplane flown by Kirsch.



The "Sesquiplan" is exhibited in the manner beloved by French constructors, *i.e.*, represented as being on a banked turn, and very effective it is. The machine, somehow, reminds one of the late Commander Porte going round the pylons at Hendon on the famous old Deperdussin "Thunderbug," scraping the inner wing tip along the top of the grass. The machine has already been illustrated in *FLIGHT*, and is a monoplane with a small pair of thin wings, braced by a single strut on each side. The fuselage is of monocoque construction, and is, if possible, of even smaller cross-sectional area than that of the "29CI." Looking at the cockpit coaming, one wonders how Sadi managed to get into the machine without the aid of a shoehorn, let alone getting out of the machine in the crash. It may be conceded that



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On the Nieuport-Delage commercial machine ailerons are fitted to the top plane only. They are operated by cranks and struts from the lower plane.

streamlining has been carried to its limit in the "Sesquiplan," and that a further reduction in resistance can scarcely be imagined. The wings are as small as it is reasonably safe to make them, and the landing speed must be about 100 m.p.h. It is to be regretted that the Hanriot did not compete in the race, as it would have been extremely interesting to see which machine is the faster. The Nieuport has a much smaller fuselage and thin wings with strut bracing, while the Hanriot has rather a "fat" body, and thick high-lift wings without external bracing. The engine is the same in both cases—*i.e.*, 300 h.p. Hispano-Suiza.

The third machine is a type "30 T2" Nieuport-Delage, a cabin machine with seating accommodation for six passengers and an open cockpit for pilot and engineer in front. It is chiefly remarkable for a very pronounced negative stagger

of the planes, the top one of which has a very much greater span than the lower, the extensions being braced by sloping struts. One cannot help wondering who designed this machine; it certainly does not share with other Nieuport-Delages that beauty of lines and proportions which characterises the smaller machines. The cabin is comfortable, and the high speed is fairly good (about 109 m.p.h. at ground level), but certainly not startlingly so, in view of the fact that the power expenditure is 70 h.p./passenger. The engine is a 420 h.p. Darracq-Coatalen. It should be pointed out, however, that a large petrol supply is carried—sufficient for 7 hours' flight at full throttle. Obviously this reduces the number of passengers, and, if reduced to four hours' duration, the useful load would be increased by nearly 700 lbs. As regards actual weight, and assuming that the cabin had room for them, this would mean another four passengers, bringing the total up to 10, with a pilot and engineer in front, raising the total number of seats to 12. For 420 h.p. this is not bad, and the performance of 109 m.p.h. for a power loading of 18.3 lbs./h.p. is above the average.

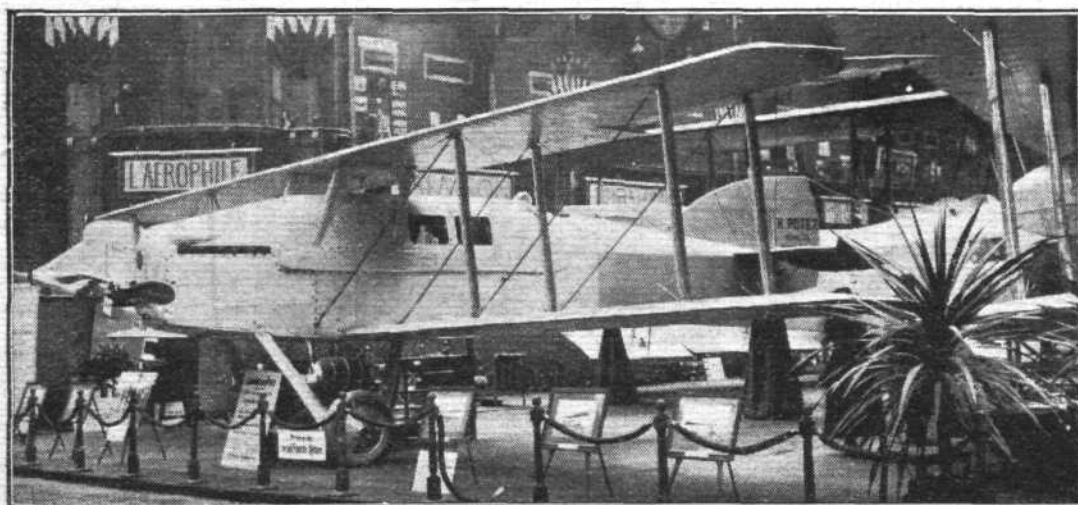
The general characteristics of the Nieuport-Delage "30 T2" are as follows: Length overall, 36 ft. 2 ins.; span, upper plane, 59 ft. 1 in.; height, 14 ft. 1 in.; wing area, 878 sq. ft.; engine, 420 h.p. Darracq-Coatalen; weight, empty, 4,260 lbs.; weight of fuel, 1,585 lbs.; useful load, 1,850 lbs.; total weight, 7,695 lbs.; power loading, 18.3 lbs./h.p.; wing loading, 8.75 lbs./sq. ft. Maximum speed near ground, 109 m.p.h.; at 3,300 ft., 106.5 m.p.h.; at 6,500 ft., 102.3 m.p.h.; at 10,000 ft., 96 m.p.h.; at 13,000 ft., 91.3 m.p.h. Climb to 3,000 ft. in 8 mins. 35 secs.; to 6,500 in 19 mins. 15 secs.; to 10,000 in 36 mins. 45 secs.; and to 13,000 in 1 h. 3 mins.; ceiling, 14,750 ft.

#### HENRY POTEZ

14, Rue Clément, Levallois-Perret (Seine)

ALTHOUGH one of the constructors who came into the aviation industry during the War, Henry Potez is quite evidently determined to remain in the industry, and an inspection of the machines exhibited indicates that his work is now at least on a par with that of the best French constructors, and certainly ahead of that of the majority. There is nothing very startling in either of the designs, but the machines are common-sense, straightforward pieces of work, and the details are, mostly, good. Three complete machines are shown, of which one is a military type, and therefore of comparatively smaller interest than the two commercial machines. This is a type "XV" with 370 h.p. Lorraine-Dietrich engine. The pilot sits in front of the gunner in the usual fashion, and the machine does not appear to differ materially from the ordinary two-seater fighter with which one became familiar during the War. The engine is neatly cowled in, and the machine generally is of clean design. The span is 39 ft. 5 ins., and the length 27 ft. 7 ins.; wing area, 485 sq. ft.; weight empty, 2,420 lbs.; weight fully loaded, 3,800 lbs.; speed near ground, 130 m.p.h.; speed at 10,000 ft., 121 m.p.h.; speed at 16,500 ft., 112 m.p.h. Climb to 10,000 ft., 13 mins.; to 16,500 ft. in 29 mins; ceiling, 20,200 ft.

Of the two commercial machines shown, the smaller, type "IX," is obviously a development of the two-seater fighter, whose general lines it preserves in spite of the presence of an enclosed cabin for the four passengers who comprise its useful load. In the light of the cross-channel services, the passenger accommodation is too small, but no doubt there are lines in France, or running out of France, on which this



The Henry Potez type IX.

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is the maximum number of passengers which can be counted upon regularly. It might be added that machines of this type have been used with great success on the Paris-Strasbourg-Prague-Warsaw line, and that until the regrettable accident some months ago, no serious mishap had occurred to any of these machines. This is a very good record when it is pointed out that since September 20, 1920, the machines of the Franco-Roumanian Aviation Co. had flown 450,272 kilometres, carried 658 passengers, 19,072 kilogrammes of goods, and 891 kg. of mails.

The machine is of clean appearance, and the detail construction appears to be very good. The cabin is small, naturally, and on a long journey the passengers might be subject to fatigue, as there is not sufficient room to stand upright. One therefore somewhat doubts the utility—in its form as a passenger carrier at any rate—of the rather long duration of flights which the large tanks make possible, i.e. 5 hours at a cruising speed of 112 m.p.h. Otherwise, the performance is certainly very good, a cruising speed of 112 m.p.h. being probably more than is really required on most routes. The maximum speed at ground level is 125 m.p.h. The pilot is installed in an open cockpit aft of the cabin.

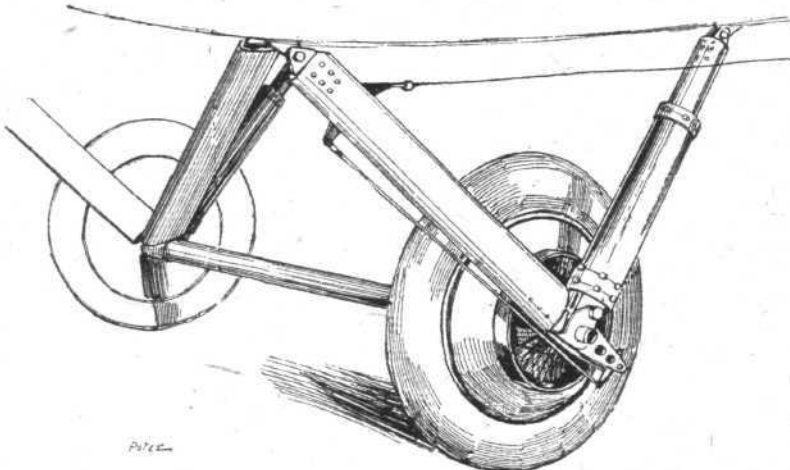
The rear portion of the fuselage is constructed in the usual way of longerons and struts of wood, with wire-bracing. The cabin portion, however, is built-up with three-ply walls, while the front portion is largely metal construction. The engine bearers themselves are of wood, but rest on four cradles of which the front and rear are of sheet steel, the intermediate ones being of ply-wood. The engine, a 370 h.p. Lorraine-Dietrich, is entirely cowled-in.

As regards the wings, little need be said, as they are of standard construction. The inter-plane struts are streamline metal tubes, pin jointed to the spars, and the bracing is by cable, the lift cables being in duplicate and with a wood filler between them.

The main characteristics of the Potez type "IX" are as follows:—Length overall, 32 ft. 2 ins.; span, 46 ft.; height, 10 ft. 3 ins.; wing area, 495 sq. ft.; weight, empty, 2,750 lbs.; weight of fuel, 726 lbs.; useful load, 1,035 lbs.; total weight, 4,511 lbs.; wing loading, 9.12 lbs./sq. ft.; power loading, 12.2 lbs./h.p.; maximum speed at ground level, 125 m.p.h.; at 6,500 ft., 121 m.p.h.; at 10,000 ft., 116 m.p.h.; climb to 6,500 ft., in 7 mins. 56 secs.; to 10,000 ft. in 19 mins. 42 secs.; ceiling, 20,000 ft.

By far the most interesting of the Potez machines is, however, the three-engined type "X.A." A photograph of this machine

possible to change pilots during a long flight. The cabin portion of the fuselage is of ply-wood construction, but one gathers that the rest is built up entirely in Duralumin. The front portion carries one of the 180 h.p. Hispano-Suiza engines, which is mounted on to the cabin as a detachable unit, being capable of being reached, if necessary, during flight. The rear portion of the fuselage can also be readily detached from the cabin, so that for shipment, the large fuselage can be dis-

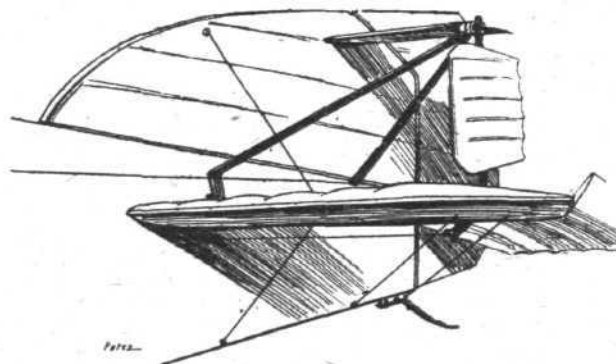
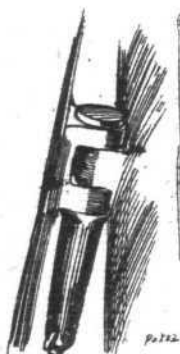
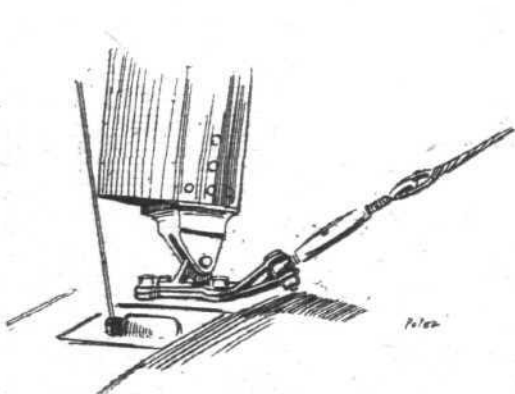


One side of undercarriage of Potez X.A. Note the band brakes.

mantled into three parts, neither of which requires a very large crate.

The planes are, as already mentioned, of all-metal construction, with exception of the covering, which is fabric. Each plane is in four pieces, the portions outside the engine struts taking down very quickly when the rest of the machine will go into a hangar of ordinary size. One of our sketches shows the quick-release pins which secure the extensions to the wing-roots. The inter-plane struts are of Duralumin, streamline section, and are attached by pin joints to the spar fittings. It might be mentioned that the wings have been sand tested, when it was found that they had a factor of safety of 12.

The two wing engines rest in vee struts, fairly high in



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**SOME POTEZ DETAILS :** On the left, the attachment of a metal interplane strut. In the centre, one of the long pins by means of which the wings are attached to the centre-sections. On the right, the tail of the three-engined machine. Note the simple way in which the bracing of the auxiliary trimming plane and rudders are braced with two simple Vee struts.

was published in our issue of November 17, page 764, and a silhouette on page 760 of the same issue. The machine has been designed to meet commercial conditions in France as well as in the Colonies, and in order to reduce as far as possible the effect of varying climatic conditions, it is built almost entirely of metal, chiefly Duralumin. Unfortunately, no details are available of the wing construction, but one gathers that both spars and ribs are of Duralumin, although the wing covering is fabric. In the absence of particulars, one cannot, therefore, express an opinion on the detail construction, but judging from what can be seen externally, the machine is well built and has several ingenious features which will be dealt with presently.

Passenger accommodation is provided for 12 passengers, the seats being arranged in two rows along the sides, and with two seats across the front wall of the cabin. The pilot sits aft of the cabin, and is in communication with it, so that it is

the gap between the planes, and are so mounted as to be readily removed from their supports in case it is desired to change an engine unit. The engines are neatly cowled-in, and there is a petrol tank behind each engine. Lamblin radiators are mounted under the engine nacelles.

As the type "X" is intended for use over all sorts of grounds, the undercarriage is of substantial design. There is a pair of vees under each engine, one vee taking the load of its engine, and the other that of the corresponding half of the body weights. A third undercarriage is mounted under the nose engine. The wheels are so placed that the outer wheels are practically under the c.g. Wheel brakes are fitted so that it is possible to pull-up the machine after a very short run. In that case, of course, the front undercarriage prevents the machine from nosing over. The shock absorbers are somewhat similar to those familiar from Blackburn machines, and are said to give excellent progressive springing.



The tail planes are of ordinary monoplane type, but auxiliary surfaces have been added to enable the machine to be flown with varying loads, and also with one of the wing engines out of action. The general arrangement of the tail is shown in one of the accompanying sketches. Above the tail plane are mounted horizontal and vertical surfaces, the former trimming the machine and the latter keeping it on its course, with one wing engine stopped. The manner in which these auxiliary surfaces are braced is rather ingenious, and very simple. A pair of vees of Duralumin streamline section tubes triangulate the auxiliary planes in both directions, and cause but little extra resistance. It is claimed that with one wing engine stopped, once the trimming rudders have been adjusted, the machine handles well on the ordinary controls, and that the only effect is that the speed with full load is reduced to about 83 m.p.h., and the ceiling to 8,200 ft. As the power expenditure, with three Hispano-Suiza engines of 180 h.p. each, is 45 h.p. per passenger carried, the machine

should be quite a good commercial proposition, although its speed is not quite so high as that of some machines with a similar power expenditure per passenger. The three-engine arrangement should practically eliminate forced landings. Sufficient fuel is carried for a flight of 6 hours at a cruising speed of about 87 m.p.h., or a range of 520 miles in still air.

Following are the main data relating to the Potez type "X.A": Length overall, 42 ft. 6 ins.; span, 60 ft. 6 ins.; height, 13 ft. 7 ins.; wing area, 1,020 sq. ft.; weight, empty, 4,620 lbs.; weight of fuel and oil, 1,200 lbs.; useful load, 2,200 lbs.; total loaded weight, 8,020 lbs.; wing loading, 7.85 lbs./sq. ft.; power loading, 14.8 lbs./h.p.; maximum speed near ground, 102 m.p.h.; at 6,500 ft., 98 m.p.h.; at 10,000 ft., 94 m.p.h.; cruising speed, 87 m.p.h.; maximum speed on two engines, 83 m.p.h.; climb to 6,500 ft. in 10 mins.; to 10,000 ft. in 17 mins.; to 16,400 ft. in 50 mins.; ceiling, 16,400 ft.

## LONDON TERMINAL AERODROME

Monday Evening, December 19, 1921

THERE has been little flying this last week, owing to persistent bad visibility, chiefly in France. The sheds at Croydon have an empty appearance today, there being no "Goliath" or serviceable French machine of any kind in them. The last two French "air expresses" returned to Le Bourget on Saturday, and nothing has come through since then to replace them.

The new D.H.18, which has the registration marking "G-EAWW," has been allocated to the Instone Air Line. Mr. Courtney was testing it on Saturday, and he also piloted the machine on its maiden "airway" journey to Paris on Sunday.

The Grands Express, now that the summer passenger rush has died away, are devoting themselves to goods traffic. They carry by far the greater portion of the merchandise consigned by air. The Instone Air Line, however, are experiencing an influx of goods from Paris. This is due to the approach of Christmas; but the goods from London to Paris still remain at a low ebb, on account, probably, of the unfavourable rate of exchange.

### A Special Daily Goods 'Plane

THE great trouble with the goods traffic is that no air transport firm has been able to make any great effort to obtain large and regular consignments, and this because of the uncertainty which has always existed as to the number of passengers forthcoming for any given machine—a fact which has prevented the firms from being sure as to the amount of goods they could accept. For this reason, goods arrive sometimes at the aerodrome, and are not dispatched until the next day.

The Instone Air Line intend to remedy this state of affairs in the spring, by running a special machine each day for goods traffic only. This will mean that they will know always just what volume they are in a position to deal with.

Handley Page Transport still appear able to get fairly good loads. On Saturday, for instance, when the passengers' baggage and the freight were weighed up, it was found they had more than they could carry. Luckily, Instone's had room on their "D.H.18," and some of the baggage was transferred to this machine. Included in the freight was a case of plum puddings made by the chef at the Hotel Metropole, and consigned to the Prince of Monaco. These were to be sent on from Paris to Monaco by passenger train.

The new general store and Post Office on the aerodrome is

now open and settling to business. The usual postal facilities are provided, and the store is well stocked with confectionery, tobacco, and groceries.

The work of fencing the aerodrome is proceeding rapidly. Quite a large piece has, already, been chopped off the aerodrome by this fencing, though it is true that much of it was rough and useless. On the other hand, a certain proportion of it was good smooth surface, and was useful for a machine that had "over-run" somewhat while landing—as may happen when, with a light north wind, alightings have to be made down-hill.

### The Latest Air-Line News

THERE have been rumours that the projected "Continental Air Lines" would not materialise in the spring. Now, however, the latest report is that difficulties have been overcome and that all is plain-sailing. The Daimler Hire are not to begin their service, it is understood, till towards the end of April, instead of, as was first intended, on March 1. Machines for both the above companies are now under construction, and I gather that the De Havilland Aircraft Co. are building four "32's" and four "34's." I am informed, also, that Handley Page are building four improved "W.8's," which are to be fitted with the Bristol Co.'s air-cooled radial engines.

The Aircraft Disposal Co. are building a number of "D.H.9a's," with Napier "Lion" engines, for the Spanish Government. Only one of these is to be flown out. The rest are to be crated and sent by boat. It is understood that this is due to the restricted size of some of the aerodromes *en route*. They are not, in the view of the insurance companies, large enough for landing these machines safely.

The aerodrome dinner on Monday last was an unqualified success. There was a large attendance of aerodrome officials, past and present, and the dinner itself was extremely good. The smoking concert which followed, provided for the most part by the personnel at the aerodrome, was very greatly appreciated. Mr. Handley Page was one of those present, and he contributed also to the entertainment. It is easy to understand why he is personally so popular with his various staffs.

The Meteorological Office on the aerodrome is greatly in demand during these days of inclement weather. The number of queries they receive, not only from pilots on the aerodrome, but from outside firms such as Bristol and De Havilland, is really surprising. Mr. Hay and his staff spend, in fact, a very busy time every morning.

### The Royal Air Force Memorial Fund

At a meeting of the Executive Committee of the Royal Air Force Memorial Fund, held on December 7, at No. 7, Iddesleigh House, Caxton, Street, London, S.W. 1, the following members of the Committee were present:—Lord Hugh Cecil (*Chairman*), Lady Leighton, Dame Helen Gwynne-Vaughan, Mrs. Barrington-Kennett, Sir Charles McLeod, Air Vice-Marshal A. V. Vyvyan, Mr. F. E. Rosher, and Mr. H. E. Perrin.

It is regretted that, owing to other engagements, neither Air Vice-Marshal Sir John Salmond nor Major-General Sir Sefton Brancker could be present at this meeting.

The usual Financial Statements and list of Grants made since the last meeting were submitted and approved. The latter item amounted to £344 4s. 8d., showing some decrease on the amount disbursed in the previous month.

The R.A.F. War Memorial matter was very exhaustively discussed, and the meeting was largely concerned with

fixing upon suitable inscriptions for the panels on the proposed Memorial at Whitehall Stairs, Victoria Embankment. These will be finally determined upon, it is hoped, at the next meeting of the Committee on January 4, 1922. Meantime, the formal consent of the London County Council and H.M. Commissioner of Woods and Forests has been formally communicated to the Committee, and it is expected that the actual work on the site will be commenced at a very early date.

With a view to disseminating throughout the Royal Air Force at home the aims and objects of this Fund, a framed Notice setting forth these matters, and appealing to "all ranks" of the serving Air Force for their support, has been distributed throughout the Air Stations in the United Kingdom, with the consent of the Navy, Army and Air Force Institutes Council. It is hoped in this manner, not only to spread knowledge of what the Fund is for and what it is doing, but that substantial contributions may be forthcoming from "all ranks" of the Royal Air Force.

# DEVELOPMENTS IN AIRCRAFT DESIGN BY THE USE OF SLOTTED WINGS

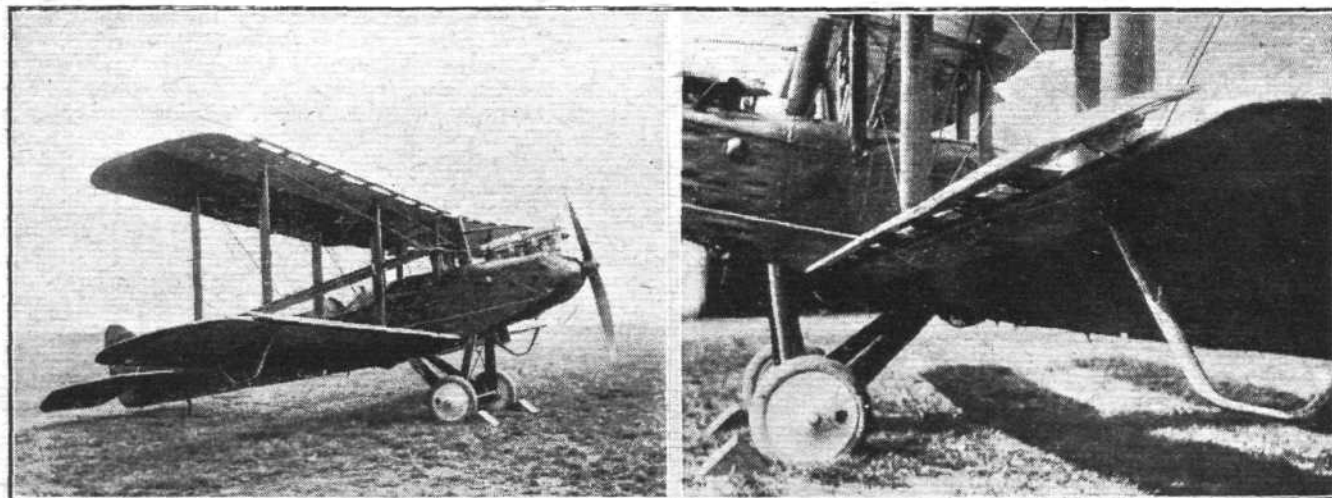
BY F. HANDLEY PAGE

[AMONG the many papers read before the International Air Congress, which was held in Paris concurrently with the Aero Show, few were as interesting as that presented by Mr. Handley Page, dealing with the applications of slotted aerofoils. By the courtesy of Mr. Handley Page, we are able to commence publication this week of his highly informative paper, which, it will be seen, treats the subject from a point of view somewhat different from that of the paper read by Mr. Handley Page before the R.Ae.Soc. in February (published in full in FLIGHT of February 24, 1921). In the following the paper is published practically in full, with here and there a few passages condensed so as to economise space—Ed.]

In his introductory remarks, Mr. Handley Page referred to the part which improvements in aero engines will have in reducing the cost of air transport. He also mentioned some minor improvements which can be effected in the design of airscrews and in careful streamlining of the fuselage. The main portion of his paper, however, dealt with improvements in the wings themselves. On this subject Mr. Handley Page stated that it was impossible to get a good ratio of lift to resistance and a high maximum lift with the same section, and that to get both combined in one plane it is necessary to have some variable device which will admit of two different effects on the resulting air flow. The lecturer

another consideration, namely the provision of a slot of such an area that sufficient air can be sent through it to clear out the dead air that tends to form on the upper or suction surface of the plane and, by preventing this formation, preventing burbling. The investigation of the right shape of slot, its angle relatively to the main plane, and the size of the openings on the upper and lower surface have been the subject of an exhaustive research to obtain the best result. So far an increase in maximum lift up to 70 per cent. has been obtained with a single forward slot, up to 100 per cent. with a slot and slotted flap at the rear, and up to 250 per cent. with a multi-slot construction. Open slots, however, though increasing lift, increase resistance whilst open. Closed, their resistance is little more than full section. Therefore a closing device is necessary for best high speed.

The slots are now designed to be closed by the pilot, either by movement of the auxiliary plane itself, or by a device for closing the slot in a similar way to a valve; the latter construction is easier and better from an economical point of view. With the upper surface so closed that the exit is completely stopped, little increase in the resistance is found by leaving the lower portion open, and the characteristics of the slotted plane with the upper exit closed, and the top surface unbroken, are practically the same as those of an unslotted plane.



**FIRST FULL-SCALE EXPERIMENT WITH HANDLEY PAGE SLOTTED WING:** On the left the "D.H.9" fitted with slotted wings, and on the right a close-up view of the arrangement of the slot.

mentioned that a similar form of device to that invented by him was devised independently by Herr Gustav Lachmann in Germany, and that at present further research work on this type of aerofoil is being carried out in England, U.S.A. and Germany. The theory of the slotted wing, he pointed out, is not yet susceptible of complete mathematical treatment, but the effect may be dealt with qualitatively. Mr. Handley Page then gave a qualitative argument deduced by Professor A. Betz, as follows:—

"If the simplest form of one plane is considered with a single slot through the forward portion, splitting this plane into two portions, an auxiliary and a main plane (see Fig. 1, middle diagram), the auxiliary plane, lying as it does with its rear edge on the upper surface of the main plane, tends to have the air at its rear edge accelerated owing to the region of accelerated air flow in which it is placed. In consequence the velocity change between the front and rear edges of the upper surface of the auxiliary plane is diminished, the pressure gradient is reduced, and the tendency to burble lessened. In a similar but reversed way the front portion of the main plane, lying as it does in the region of the reduced air flow of the rear edge of the auxiliary plane, has the velocity of the air flow reduced. There is, therefore, a lesser change of velocity from front to back of the main plane, and therefore a lesser tendency to burble."

The above explanation deals only with the position of the planes relatively to one another, and their mutual effect on one another. It is necessary, however, to take into account

A complete experimental plane built with the slots is shown in the accompanying photographs. In one view the forward slot is open and the gap between the auxiliary and the main plane can clearly be seen. In another the slot is shown closed. The opening and closing of the slot are effected by a lever control in the pilot's cockpit.

Some actual test results will now be given. The lift coefficient is measured in absolute units. From it the lift can be obtained from the formula:—

$$\text{Lift in lbs.} = K_y \cdot \rho \cdot g \cdot A \cdot V^2$$

Where  $K_y$  = lift coefficient (absolute).

$\rho$  = Density of the air in lbs. per cubic ft.

$g = 32.2$ .

$A$  = Area of plane in sq. ft.

$V$  = Velocity in ft. per sec.

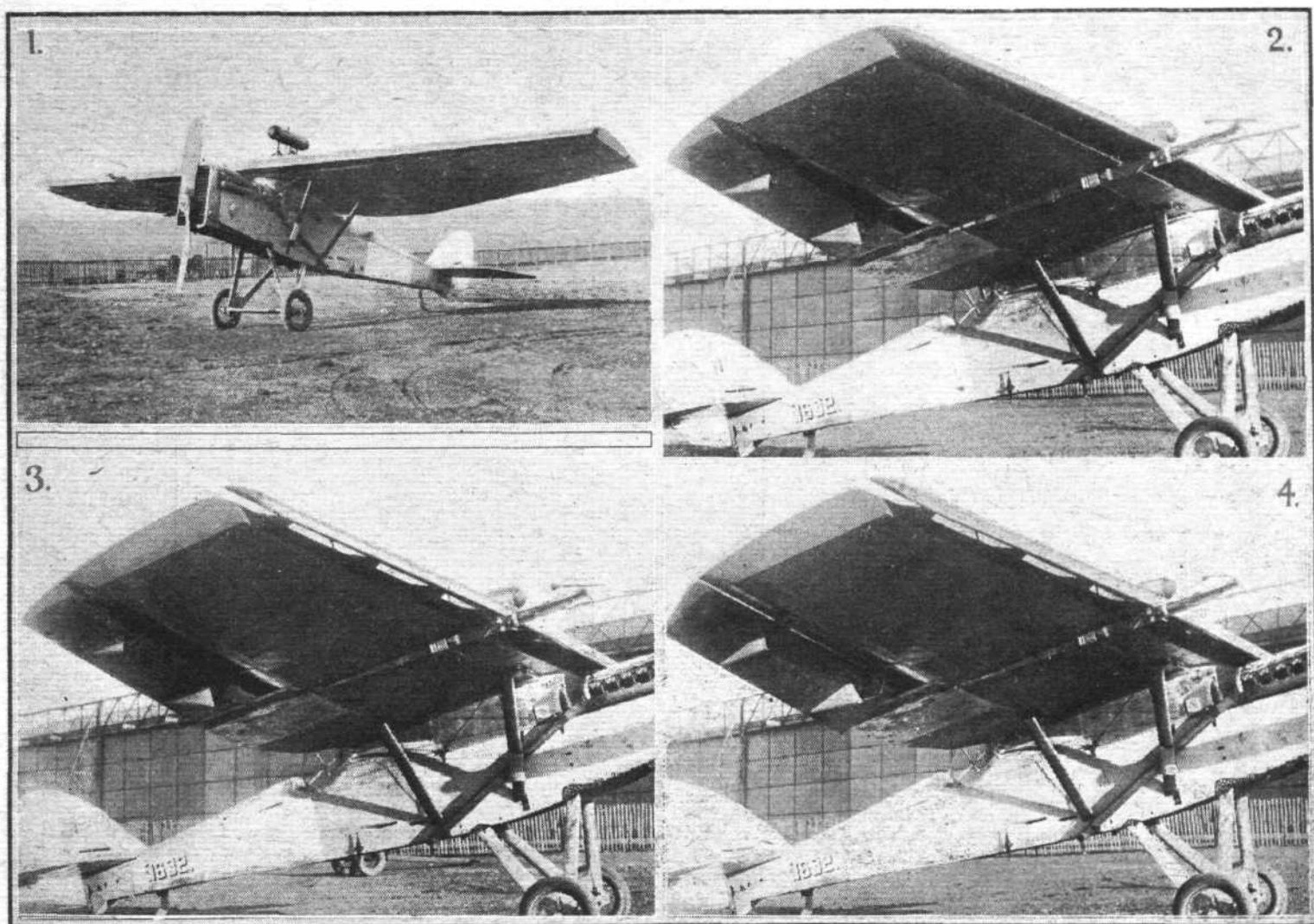
The tests are on four different plane sections known as RAF/15, RAF/6, RAF/19 and Airscrew 4. The sections tested are shown in Figs. 1, 2, 3 and 4, respectively.

RAF/15 is a thin high-speed section and the variation of lift with angle of incidence with a front slot only, as well as with a slot in front of the flap, is shown in Fig. 5.

An increase in lift is obtained not only by increasing the angle of the flap, but also by placing at the forward end of the flap a slot of similar section to that in the front (see the cross section at the bottom of Fig. 1).

For RAF/6 a very complete set of tests is given, the results of a test on a model carried out at the National Physical Laboratory, the actual figures for which are given in Table I.



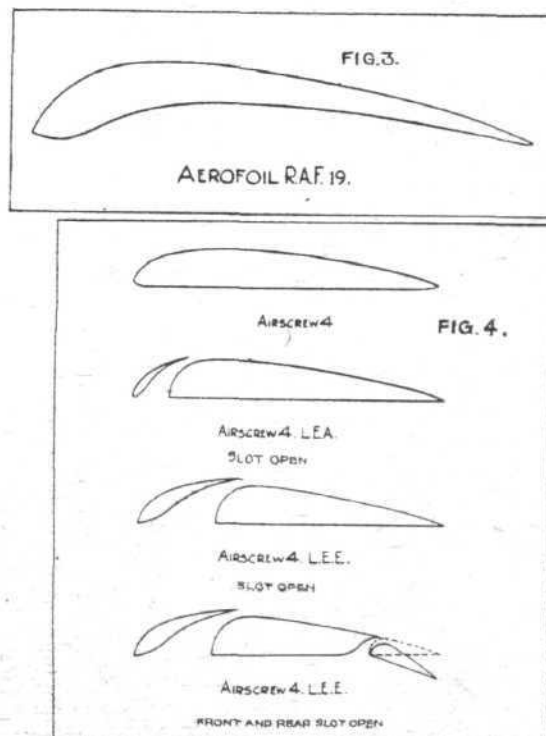
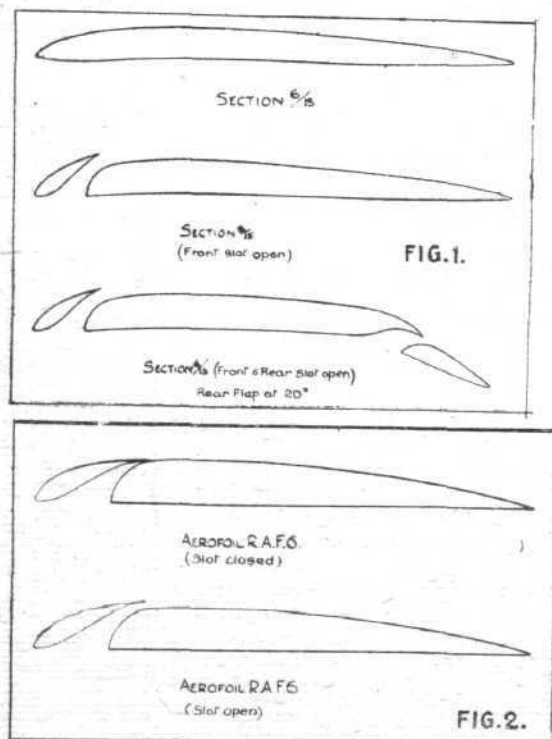


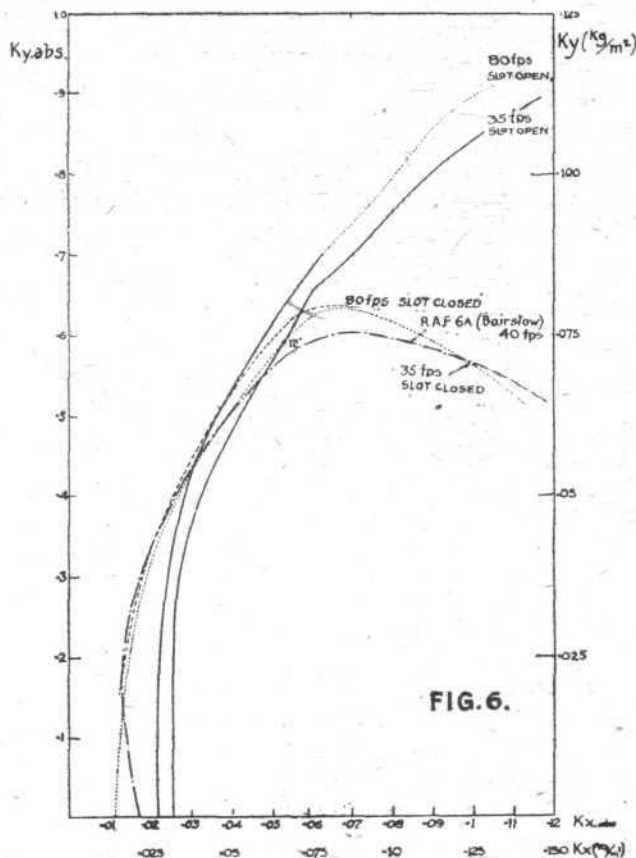
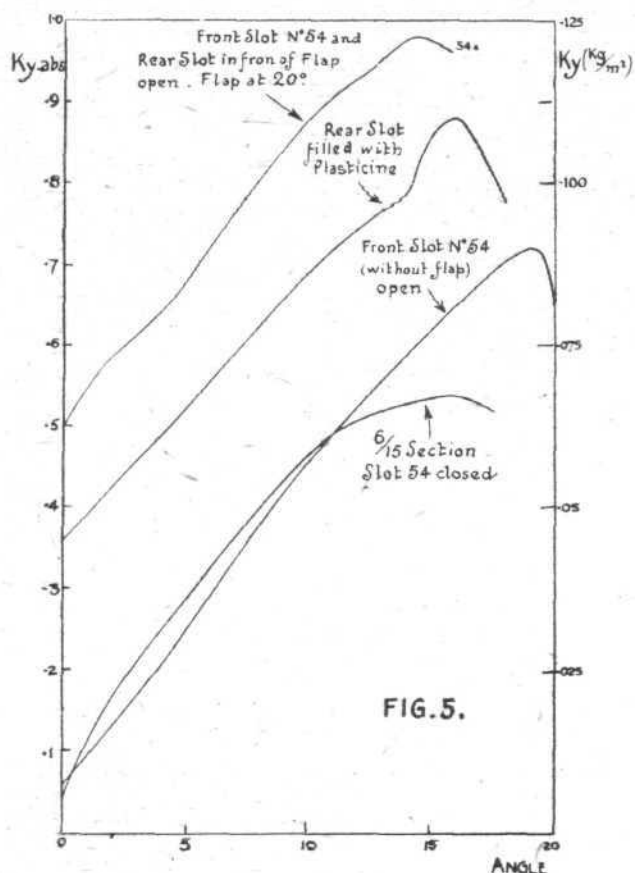
**THE HANDLEY PAGE SLOTTED WING TESTED AS A MONOPLANE: 1, The complete machine. 2, Slot closed and aileron normal. 3, Slot open and aileron normal. 4, Slot open and aileron down.**

The curves have been plotted both in the usual polar diagram (see Fig. 6) as well as the lift coefficient plotted against angle of incidence (Fig. 7). In addition the curve of horse power against speed has been plotted for this section

(Fig. 8), the vertical ordinates being  $Kx/Ky^{3/2}$  (abs.) and the horizontal  $1/\sqrt{Ky}$ , these units being proportional to the horse power and speed respectively.

The curves in Fig. 9 show the increase in lift with a single





slot, and also with the slotted flap for Aircscrew 4. The latter is a plane of thick section tested at the National Physical Laboratory. (British Advisory Committee for Aeronautics. Report 1916-17, p. 109.)

Further curves are shown in Fig. 11 for RAF/19. This is a high-lift section tested out with a multiple slot arrangement up to seven slots in all. The lift reaches the very high value of lift coefficient of nearly 2 in absolute units.

The curves in Figs. 7 and 9 are probably the most interesting, showing as they do the increase in lift that is obtained by a single slot on a wing of normal thickness, and on one of a thicker section suitable for a cantilever machine. From this it is apparent that with a single slot an increase in lift of about 60 per cent. can be obtained, and that by the simultaneous use of a slotted flap at the rear of a section,

the angle at which this extra lift is obtained is not abnormal.

These results, whilst of great theoretical and practical interest to the aeronautical designer, do not bring home the advantage of the use of the slotted plane so well as a calculation of the horse power that is saved by its use. Accordingly calculations have been made of the power required to drive through the air planes of RAF/15 and Aircscrew 4 section, for slotted compared with unslotted planes. In each case a landing speed of both 50 and 55 miles per hour has been assumed, and for each, with a propeller efficiency of 77 per cent., the horse power for a top speed of 120 miles per hour as well as 130 miles per hour has been calculated. The results are incorporated in Tables II, III and IV.

(To be concluded next week.)

## Army and Air Force Relations

THE Army Council and Air Council, acting within the statutory powers conferred on them for the maintenance of discipline in areas where Military and Air Forces are acting together, have issued an order under which officers, non-commissioned officers, and men of the Royal Air Force acting with any body of the military forces in the area of Aden will, in relation to such military forces, have all such powers (other than powers of punishment) as they would have if they were military personnel. The order does not, however, render the Air Force personnel subject to military law.

### French Government and Aerial Budget

LAST week the votes for the Air Budget were passed by the French Chamber, the chief items being subsidies 46,389,000 Frs., aerodromes 36,690,000 Frs., reserve training 3,345,000 Frs., specific work and expenses 86,405,000 Frs. Curiously the Chamber of Deputies so far has not renewed the credits for the Air Attachés in London, Washington, Rome and Peking.

### Past Service and Increment Pay

An Army Order provides that prior service with the Royal Marines, Royal Navy or Royal Air Force, or active service with a Colonial corps will count for increments of pay in the rank of private.

### Cairo and Baghdad Air Mail

EARLY last week the Postmaster-General issued a notice that the Christmas mail for transmission by air from Cairo to Baghdad would be dispatched from London on December 15. The mail is due at Port Said on December 21, and, subject to favourable weather conditions, will be forwarded by air from Cairo on the following day ; it should thus reach Baghdad on or about December 23, and letters

for Baghdad and places near will, in that case, be delivered by Christmas Day. The public are, however, informed that this is the season of contrary winds in Mesopotamia, and the arrival of the air mail may consequently be delayed.

By arrangement with the Air Ministry, the Cairo-Baghdad air mail fee has been reduced from 1s. to 6d. per oz., and letters sent by this week's dispatch will be the first to secure the advantage of the reduction. The charges will, therefore, consist of the air fee of 6d per oz., in addition to ordinary Imperial postage.

There is a steady growth in the use of the Cairo-Baghdad air mail service by the public. On October 13, last, the mail only contained 57 letters. On November 17, the number was 172. On December 1, there were 354 letters. The average time of transmission by ordinary mail from London is 27 days. The air mails dispatched from London during the past two months have reached Baghdad on the average in 12 days, and on three occasions out of five in 10 days or less.

### Prize Court Award to Air Pilots

IN the Prize Court on December 13, a bounty of £350 was awarded by the President for the destruction of the Turkish destroyer "Yardigar-I-Milet" by the British aeroplane "3124." According to the affidavit of Flight-Commander McClelland, on July 9, 1917, he was on board the aeroplane, which was making a raid on the "Goeben" at Constantinople. He was accompanied by Flight-Commander K. S. Savory, D.S.O., Royal Air Force, the senior officer on board, who is now in West Africa, and Lieut. P. T. Rawlings, Royal Naval Volunteer Reserve. From a height of 800 ft., they dropped bombs on enemy submarines and destroyers lying close to the harbour wall. As a result, the Turkish destroyer in question was sunk and destroyed. Seventy persons were believed to be on board.



# DEVELOPMENT OF THE FIGHTING AEROPLANE

BY CAPT. F. M. GREEN

A PAPER under the above title was read by Capt. F. M. Green before the Royal Aeronautical Society on December 15, 1921. The first part of the paper was purely historical, dealing with the various steps in the development of fighting aeroplanes from the beginning of the War up to the present time. It is not proposed here to publish a detailed report of this part of the paper, as the history of the fighter is already well-known to readers of this Journal. One point, however, appears to deserve mention, since it is probably not generally known. Capt. Green referred to an aeroplane, which was to all intents and purposes purely a racer, that was tested at Farnborough in the early summer of 1912. This machine was fitted with flaps the complete length of the wings, so arranged that the angle could be altered during flight in order to decrease the landing speed. The use of flaps is not, therefore, altogether a new idea, although considerable improvements have been incorporated in modern versions.

On the subject of armament the lecturer concluded with the following remarks:

"Hitherto, we have only considered guns of the machine-gun type. It is possible that advantage will be found in firing a bullet larger than these of the present calibre. It is also possible that guns will be produced firing something more of the nature of shrapnel. The writer prefers not to suggest development along these lines, but will content himself by remarking that whatever is produced must be small and light, otherwise the loss of the all-important power of dodging will be lost."

Concerning the all-important question of view, the lecturer expressed the opinion that by far the best compromise is obtained when the pilot sits with his head in line with the chord of the top plane and not too close to it. The front of the fuselage should slope down towards the engine, and the lower plane should be of as narrow chord as possible, and have its trailing edge about vertically beneath the pilot. The chief objection generally raised to seating the pilot behind the top plane, is that the moment of inertia of the whole aeroplane is increased. Capt. Green pointed out what he considered to be fallacies in the general opinion of pilots, that a rotary engine enabled a pilot to sit close up to the engine and produced an aeroplane which was extremely easy to manoeuvre fore and aft. Firstly, he pointed out, the increased gyroscopic effect of the rotary is practically equivalent to an increased moment of inertia. Secondly, it is always easily

possible to manoeuvre a small aeroplane fast enough in the fore and aft direction to break it, and it is therefore of no advantage to provide quicker control than we have now, without increasing the strength of the machine beyond what is practicable.

Turning his attention to the ability of a machine to withstand damage, Captain Green pointed out that duplicating a wire by means of another wire alongside it may be dangerous, as one bullet is likely to destroy both wires, and he thought that the ideal arrangement is to make a structure which is braced by two or more independent systems.

Regarding performance, the lecturer stated that experience has shown that rate of climb is the governing factor. He did not think that there is any great probability of increasing the ratio of horse-power to weight beyond 7 lbs. per h.p., or so of the modern loaded aeroplane. The most promising way, in his opinion, of increasing the ceiling and rate of climb at high altitudes is to design engines which give the same or nearly the same power at considerable heights as they do at ground level. By using air compressors he thought there was no reason why the ceiling of a scout should not be increased from slightly over 20,000 ft., as it is now, to 35,000 or 40,000 ft. As the pilots could probably not be expected to fly at these great heights, the air compressor gear would probably be used mainly to increase the rate of climb and manoeuvring power at altitudes of about 20,000 ft.

Attempting to look into the future, the lecturer thought that in about ten years' time, we may look forward to the development of two separate types of single-seater fighters, one adapted for attacking enemy aircraft in one long dive, and the other more suitable for "dog fighting." The former type, he thought, is likely to remain somewhat similar to that now in use, but will probably have a rate of fire of at least 4,000 rounds per minute. The speed of the machine at 20,000 ft. will probably be in the neighbourhood of 160 miles per hour, while diving from that height a speed of 300 miles an hour is likely to be attained. The other type that should be developed, he thought, is one in which the pilot has a clear field of fire ahead, and in which almost everything is sacrificed to rapid manoeuvring. The guns should be so mounted that they are moved by some form of servo-motor in accord with a sight. The rate of fire in this type is not quite so important: possibly 2,000 rounds per minute will be sufficient.

## NOTICES TO AIRMEN

### Northolt Aerodrome : Obstruction

A TEMPORARY fence has been erected across the southern portion of Northolt aerodrome at a distance of approximately 450 yards from the line of hangars. The existence of this obstruction necessitates the exercise of great care when landing over the sheds in a south wind.

(No. 103 of 1921.)

### Aerodromes for Civil Use : Amendments

NOTICE to Airmen No. 81 (Consolidated List of Aerodromes) of 1st October, 1921, is amended as follows:—

LIST B.—*Aerodromes available for Civil Machines in Emergency only.* (b) The following should be deleted: Coal Aston; Manchester.

LIST C.—*Licensed Civil Aerodromes.* Radcliffe, Lancs., should be added.

(No. 104 of 1921.)

### Holland : Rotterdam Aerodrome

I. NOTICE to Airmen No. 126 of 1920 is amplified as follows: *Rotterdam.* Civil Customs Aerodrome. (a) *Position.*—Lat. 51° 53' N., long. 4° 27' E. Situated 6 kms. S.S.W. of Rotterdam, 2 kms. S. of Waalhaven Dock, to the immediate N.W. of Zuidhoek village.

*Description.*—Very good surface, the whole of which is raised above the level of the surrounding country and well drained. Height above sea level, 100 feet. Dimensions for landing, 1,100 by 820 yards.

*Obstructions.*—N.E. corner.—Sheds and buildings. Three W/T and D.F. Masts, and Aerials.

S. side.—High trees along road.

*Markings.*—A large white circle is marked in the centre of the ground. A wind sleeve illuminated at night is mounted on the eastern hangar.

*Aerial Lighthouse.*—An aerial lighthouse is being erected in the N.E. corner of the aerodrome. Pending the establishment and lighting of a permanent signal light, the S.W. corner pillar of the lighthouse structure will on week-days, from half an hour after sunset until two hours after sunset and at such other hours as necessary, be illuminated with a vertical row of white fixed lights casting a light in a S.W. direction; the circular rail of the gallery (62 ft. high) will also be illuminated with a row of white fixed lights casting a light skywards.

*Night Landing Arrangements.*—Searchlights, flares, etc., are available for use on request.

*Accommodation, Supplies, etc.*—Hangars, petrol, oil, water, and facilities for repairs are available.

(No. 105 of 1921.)

### Belgium : Ostend Lighthouse

NOTICE to Airmen No. 23 of 1921, paragraph 2, is amended as follows:—*Ostend Aerodrome.*—The coastal light at Ostend Harbour, situated 3½ kms. N.N.E. of the aerodrome, in position Lat. 51° 14' N., long. 2° 56' E., showing a fixed white light 92 ft. above high water, has now been discontinued and replaced by a flashing light in close proximity to the old light on the eastern side of the entrance to the port, at a distance of 3.50 cables (700 yards), 259° true bearing, from the centre of Fort Napoleon (3½ kms., 15° true bearing, from the aerodrome), Lat. 51° 14' N., Long. 2° 56' E., as before.

*Characteristics.*—Group flashing white light, showing two flashes every fourteen seconds, thus:—Flash, 0.5 sec.; Eclipse, 2.5 secs.; Flash, 0.5 sec.; Eclipse, 10.5 secs.

Height above sea level, 99 ft.

Visibility, 15 miles. Exhibited from a framework on sub-structure.

(No. 106 of 1921.)



## SOME K.L.G. AVIATION PLUGS

AERO engines, owing to the exceptionally arduous conditions under which they function, require sparking plugs of quite a different character than those obtaining in motor-car practice, whilst, in addition, the large variety of aero engine types designed to meet different requirements calls for special types of plugs to give the best results in each particular case—and it is remarkable how the conditions vary with the different types of aero engines now in use.

During the War, at the request of the Air Ministry, the Robinhood Engineering Works, Ltd., of Putney Vale, London, S.W. 15—the makers of the well-known “K.L.G.” sparking-plugs—conducted numerous experiments with the object

strong enough to withstand the effects of centrifugal force, and other trying conditions met with in this type of engine.

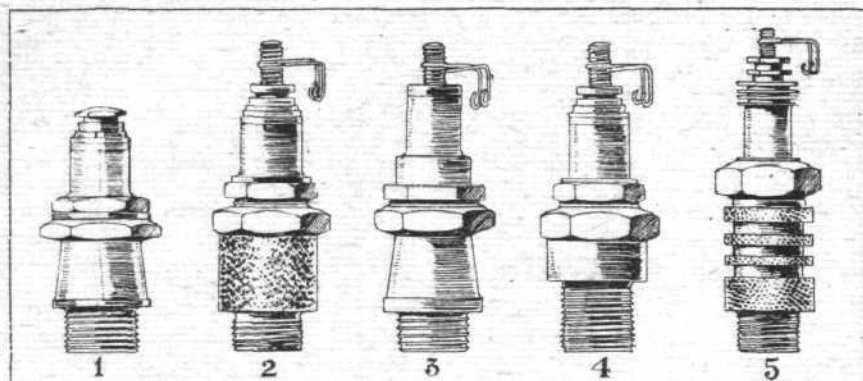
The “K.L.G.” F. 9 is a plug designed accordingly, and is suitable for all rotary engines—it has been supplied in large quantities to the R.A.F. It is of the detachable type, and possesses all the essential features of design of other “K.L.G.” aero-plugs, so modified as to reduce weight and size to a minimum. It is made with a standard reach of  $10\frac{1}{2}$  mm. only.

The “K.L.G.” F. 12 was produced to meet the requirements of the “hotter” engines, such as the Rolls-Royce “Falcon,” “Hawk,” “Eagle,” and “Condor,” and Sunbeam “Cossack” and “Matabele.” It is of the detachable type, with a standard reach of  $10\frac{1}{2}$  mm., and the fact that it was this model that was used by all the competitors for the Atlantic, Australia, and England-S. Africa flights is sufficient for its recommendation.

Another type is the F. 14, also of the detachable pattern, with a standard reach of  $10\frac{1}{2}$  mm., having a rust-proof body. This plug is a development of the famous “K.L.G.” F. 7, of which over one million were supplied to the Air Force during the War. In the F. 14, a new method of construction enables it to withstand greater heat as compared with the F. 7, whilst at the same time its oil resisting qualities are improved. It is, therefore, recommended for the following engines: A.B.C. “Wasp” and “Dragonfly,” Anzani, Beardmore, Green, Hispano-Suiza, R.A.F., Renault, and Sunbeam “Arab.”

The F. 15, which was produced to replace the F. 10, is similar to the F. 12, except that the reach is increased to 18 mm., and incorporates an improved construction. The F. 15 is suitable for the B.H.P., Liberty, Napier “Lion,” Siddeley “Puma,” etc.

A special plug, the “G.B.” has been designed for exceptionally hot engines, such as the Sunbeam “Maori,” “Manitou,” “Sikh,” and “Dyak.” It is of the non-detachable type, with a long length of body. It should be noted, however, that this plug is quite unsuitable for the majority of aero engines, and should not be used except for the types specified. “G.B.” plugs were used in the “Maori” engines of “R.34,” on its Atlantic flight.



Five “K.L.G.” Aviation Plugs: 1. The F. 9 for rotary engines. 2. The F. 12. 3. The F. 14. 4. The F. 15. 5. The C.B. non-detachable.

of producing various patterns of plugs to meet all conditions of aero work. The result of these investigations is a range of “K.L.G.” plugs, each of which is specially suitable for some particular type, or types, of aero engine. We give this week a few notes on some of these plugs, together with illustrations of the same—and here we would again draw our readers’ attention to the fact that owing to an oversight, we inserted in our issue for November 24, last, an illustration of a Model G-1 (motor car type) “K.L.G. plug, instead of one of the aviation models.

Of all the types, perhaps the rotary engine is the most exacting in its wants as regards the sparking-plug. This, not only has to be as light and small as possible, but has to be



### Married

Wing-Commander ALFRED WILLIAM IREDELL, R.A.F., second son of the late Col. J. S. Iredell, Bo.S.C., was married on November 30, at St. Andrew’s, Frognal, Hampstead, to MARJORIE, second daughter of ROBERT SCHOLEFIELD, of Rathgar, Dublin.

Captain VINCENT BUXTON, O.B.E., R.A.F., only son of W. H. Buxton, Esq., of St. Asaph, was married recently in London to KATHLEEN, younger daughter of Major PERCY A. E. WOOD, late the York and Lancaster Regt.

BRIAN HERBERT COOK, Flight-Officer, R.A.F., eldest son of Mr. and Mrs. G. H. Cook, Johannesburg, S. Africa, was married on December 12, at Laverstock, Wilts, to DORIS ELIZABETH, fourth daughter of A. C. GIBBINS, Esq., of Durban, Natal.

Flight-Lieut. HAROLD HARRINGTON BALFOUR, M.C., second son of Colonel Nigel H. Balfour, O.B.E., and Mrs. Nigel H. Balfour, of Belton, Camberley, was married on December 15, at Holy Trinity Church, Kensington Gore, to DIANA BLANCHE second daughter of Sir ROBERT and the Hon. Lady HARVEY, of Langley Park, Slough. The Rev. H. D. Viener, Chaplain-in-Chief to the Royal Air Force, officiated.

CHARLES EDWARD BARRACLOUGH, R.A.F., of Lowestoft, was married on December 10, at All Souls’, Langham Place, W., to ESTHER MARY GOODMAN, of Ellesmere House, Northampton.

WILLIAM LANCELOT JORDAN, D.S.C., D.F.C., Capt., ex-R.N.A.S., youngest son of Mrs. J. E. Jordan, of London and

Demerara, was married on November 30, at the British Consulate, and afterwards at All Saints’ Church, Kobé, Japan, to HAZEL, youngest daughter of FRED THORNE, Esq., J.P., and Mrs. THORNE, of “Greylake,” Beaconsfield Road, Blackheath, London, S.E. 3.

Mr. GERALD O’ROONEY (late Royal Irish Fus. and R.F.C.), youngest son of the late Robert Alexander Rooney, was married at Nice on November 25, to LA BARONNE J. DE VEYRAC, widow of Baron de Veyrac and eldest daughter of the Marquis de FRÉVAL DE RIBAINS, Maire and Conseiller-Général de la Haute-Loire, Officier de la Légion d’Honneur, and of the Marquise DE RIBAINS, née de Resnes.

JAMES BAYNE TWEEDIE, St. Martins, Guernsey, youngest son of David Tweedie, of Woodcroft, Edinburgh, was married on December 1, at the Church of St. Michael and All Angels, Dinder, Somerset, to OLIVE ALEXANDER, twin daughter of JAMES GALLOWAY, of Sharcombe Park, Wells, Somerset.

### To be Married.

A marriage has been arranged between Mr. BIRT DAVIES (late Captain, R.N.A.S.), of Boxdale, Walton Heath, and Mrs. DONALD BAYLIS, widow of the general manager of the Sir Thomas Beecham Opera Company. The ceremony will take place at St. Margaret’s, Westminster, on January 14, at 2 p.m.

The engagement is announced between Mr. C. F. HORSLEY, M.C., R.A.F., and Kathleen, daughter of Mr. and Mrs. ARTHUR SIMS, of Bromley, Kent.



# THE ROYAL AIR FORCE

London Gazette, December 6

**Medical Service**

Flight-Lieut. R. J. Monahan, M.D., relinquishes his temp. commn. on ceasing to be employed; November 11.

**Memorandum**

Three cadets are granted hon. commns. as Sec. Lieuts. with effect from the dates of their demobilisation.

London Gazette, December 9

**General Duties Branch**

Flying Offr. F. Williams, M.C., D.F.C., is placed on half-pay (Scale A), from Nov. 18 to Dec. 6, inclusive.

**Memoranda**

Lieut. T. B. Bruce relinquishes his temp. commn. on appointment to the Ind. Army; Feb. 7, 1920 (*Gazette*, Feb. 20, 1920, and March 12, 1920, are cancelled, and *Gazette*, July 18, 1919, stands). The permission granted to Sec. Lieut. L. Goater to retain his rank is withdrawn on his joining the Army.

**Erratum**

*Gazette* of Dec. 2, page 9,785.—In notification concerning Sec. Lieut. (Hon. Lieut.) C. J. Poole, for Oct. 4, 1920, read Oct. 12, 1920.

London Gazette, December 13

**General Duties Branch**

A. E. T. Bruce is granted a short service commn. as a Flying Offr., with effect from, and with seniority of, December 2.

The following Pilot Offrs. on probation are confirmed in rank:—C. Gardner, E. C. Moon, G. J. Rayner; September 29.

Flying Offr. P. R. Pratt is placed on the retired list; December 14.

**Stores Branch**

S. A. Martindale is granted a temp. commn. on probation as a Flying Offr.; April 11 (substituted for *Gazette*, May 3). Flight-Lieut. C. G. Murray, O.B.E., is granted a perm. commn. in his present substantive rank, with effect from September 12, 1919, and is transferred to the Stores Branch for Accountant duties, with effect from September 1. *Gazette* of September 12, 1919, appointing him to a short service commn. is cancelled. Flying Offr. R. M. Grundy is granted a perm. commn. in his present substantive rank, with effect from October 10, 1919, and is transferred to the Stores Branch for Accountant duties, with effect from July 1. *Gazette* October 10, 1919, appointing him to short service commn. is cancelled. Flying Offr. A. C. Lobley is transferred from General Duties Branch to Stores Branch for Accountant duties; September 1. The seniority of all officers granted commns. in Stores Branch for accountant duties is provisional only; the final seniority list will be promulgated when establishment is completed.

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified:—

**Wing-Commander.**—R. C. M. Pink, C.B.E., from Headquarters, Coastal Area, to command Aircraft Depot, Egypt (Middle East Area). 29.11.21.

**Squadron-Leader.**—E. E. Sanford, A.F.C., from R.A.F. School (India) to Headquarters, Middle East Area, on ceasing to be attached to R.A.F. Hill Depot (India). 22.10.21.

**Flight-Lieutenants.**—C. R. Keary, from No. 3 Squadron (India) to R.A.F. School (India). 1.10.21. P. B. Hunter, from No. 2 Flying Training School (Inland Area) to Half-pay List. 12.12.21. A. R. Pipon, D.S.C., from No. 267 Squadron (Mediterranean Group), to H.M.S. "Pegasus" (Mediterranean Group), on ceasing to be attached to Seaplane Repair Base. 1.11.21. C. Porri, from No. 1 Group Headquarters (Inland Area) to Headquarters, Middle East Area. 29.11.21. A. D. Newbury, from R.A.F. Airship Base (Coastal Area) to Inspector of Recruiting (Coastal Area). 12.12.21. R. S. Topham, M.B., D.P.H., from Aircraft Depot (India) to No. 31 Squadron (India). 26.10.21. J. C. Smyth, from No. 60 Squadron (India) to Aircraft Depot (India), on ceasing to be attached to R.A.F. Hill Depot (India). 25.10.21.

**Flying Officers.**—A. E. T. Bruce, to R.A.F. Depot (Inland Area), on appointment to Short service Commission (Supernumerary). 2.12.21. T. J. D. Atteridge, to Research Laboratory and Medical Officers' School of Instruction (Inland Area), on appointment to short service commission. 16.11.21. To Headquarters, Coastal Area. 3.12.21.

**Flight Lieutenants.**—W. H. Hoile, M.B.E., from No. 4 Stores Depot to No. 3 Stores Depot. 6.12.21. R. D. Ward-James from No. 4 Stores Depot to R.A.F. Base (Headquarters), Gosport (Coastal Area). 6.12.21. J. S. Windsor, M.C., from Central Flying School (Inland Area) to No. 4 Flying Training School (Middle East Area). 1.12.21. B. E. Baker, D.S.C., M.C.,

A.F.C., from Central Flying School (Inland Area) to No. 4 Flying Training School (Middle East Area). 1.12.21.

**Wing-Commander.**—T. O. Lyons, O.B.E., from No. 4 Stores Depot to Iraq Group Headquarters (Middle East Area). 3.12.21.

**Squadron-Leaders.**—J. S. T. Bradley, O.B.E., from Headquarters, Inland Area, to command No. 14 Squadron (Middle East Area). 1.12.21. Hon. L. J. E. Twistleton-Wykeham-Fiennes, from No. 1 School of Technical Training (Boys) (Halton) to Palestine Group Headquarters (Middle East Area). 1.12.21. B. E. Smythies, D.F.C., from Headquarters, R.A.F., India, to R.A.F. Depot (Inland Area) (Supernumerary). 12.11.21. R. L. Roe, O.B.E., M.B., from Headquarters, Inland Area, attached to School of Army Co-operation (Inland Area) for temporary duty. 5.12.21.

**Flight-Lieutenants.**—W. H. Hoile, M.B.E., from No. 4 Stores Depot to No. 3 Stores Depot. 6.12.21. R. D. Ward-James, from No. 4 Stores Depot to R.A.F. Base (Headquarters), Gosport (Coastal Area). 6.12.21. D. Mitchell, from Headquarters, Coastal Area to Egyptian Group Headquarters (Middle East Area). 1.12.21. F. H. M. Maynard, A.F.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to Headquarters, Middle East Area. 1.12.21. J. T. Forbes, from Stores Depot Egypt (Middle East Area) to No. 56 Squadron (Middle East Area). 11.10.21. C. H. B. Jenner-Parson (Inspector of Recruiting, Coastal Area), to R.A.F. Recruiting Depot, Newcastle. 12.12.21. E. A. Beaulah, from Headquarters, Inland Area, to Headquarters, R.A.F., India. 3.12.21. T. H. McDowell, from School of Photography (Inland Area) to R.A.F. School (India). 3.12.21. E. L. Howard-Williams, M.C., from R.A.F. Depot (Inland Area) to No. 25 Squadron (Inland Area). 12.12.21.

**Flying-Officers.**—J. Marsden, to R.A.F. Depot (Inland Area). On Appointment to short service commn. 7.12.21. S. G. Williams, to R.A.F. Depot (Inland Area). On appointment to short service commn. 9.12.21.

## ROYAL AIR FORCE SPORTS BOARD

**Fencing: Royal Air Force v. Royal Navy**

THE Royal Air Force beat the Royal Navy in a fencing match held at Portsmouth (on Monday, 12th), by 19 fights to 17.

The results were:—

Foil: R.A.F., won 6 fights to 3.  
Epée: R.A.F., won 7 fights to 2.  
Bayonet: R.A.F., won 5 fights to 4.  
Sabre: R.N., won 8 fights to 1.

Total.—R.A.F., won 19 fights to 17.

**Royal Air Force Football Club**

THE games in the second round of the Royal Air Force Football Cup Competition have now been played, with the following results:—

Halton "A" ..	5	Henlow "A" ..	4
Hilton "E" ..	0	Henlow "B" ..	2

R.A.F. Records	(Scratched)	Duxford	Twice	(Game
Biggin Hill		Henlow "C"	drawn	given to
				Duxford)

Halton "B" ..	0	Eastchurch ..	2
Uxbridge "M" ..	3	No. 6 Flying Training School, Manston ..	0

Netheravon ..	2	Manston "A" ..	3
Upavon ..	1	Graih ..	1
Gosport ..	7	Cranwell "B" ..	5
Calshot ..	0	Spittlegate ..	1

In the draw for the third round of the Competition, the teams have been matched as follows:—

Halton "A" v. Netheravon.  
R.A.F. Records v. Uxbridge "M."  
Duxford v. Henlow "A."  
Eastchurch v. Manston "A."  
Cranwell "A" v. Cranwell "B"  
Gosport v. Uxbridge Headquarters.  
Donibristle v. Leuchars.

Bye—Shrewsbury.

These matches will be played on or before January 4, next.

**Relinquishment of R.A.F. Station, North Queensferry**

THE land and buildings comprising the R.A.F. Station at North Queensferry have been passed to the Disposal and Liquidation Commission, for disposal.

**No. 6 Wing R.N.A.S. Reunion Dinner**

THE third of the Annual Dinners of No. 6 Wing, R.N.A.S., Otranto, Italy, was held at the Connaught Rooms on December 10.

Twenty-six of the officers who were members of the Wing were present, as also were Vice-Admiral Mark Kerr and Rear-Admiral Murray Sueter, M.P., to whom the Wing owes its origin.

Squad-Lieut. Conway Pulford presided at the dinner, and, after "The King" called on Wing-Commander R. Tomlinson to propose "Absent Members."

This he did in a well-chosen speech, reading out the names of those members who, being unable to attend, had written sending their good wishes, and in addition letters of congratulation from Admiral Howard Kelly, Col. E. G. O. Beuttler, and wires from Wing-Commander C. H. K. Edmonds and Surgeon A. L. Dykes.

Rear-Admiral Murray Sueter recalled the early days when the Wing was being formed, and spoke also of his work as a member of Parliament, in connection with the R.A.F. and its development.

He was followed by Vice-Admiral Mark Kerr, who, in a speech of the utmost interest, reviewed the position of aircraft in Naval Strategy of the future, and the modification in the utility of the capital ship that it had already brought about.

Finally, Major J. S. F. Morrison, in his inimitable manner, convulsed everyone by his account of incidents in the journey out to Italy of the first party of officers and ratings, in March, 1917.

Members remained for some time after the dinner talking to their friends, reluctant to leave a reunion, which in cordiality, if not in numbers, surpassed if possible its predecessors.



## LEGAL INTELLIGENCE

### Great Northern Aerial Syndicate, Ltd.

AN application in connection with the affairs of the Great Northern Aerial Syndicate, Ltd., which opened an aviation centre near Bidston Station a couple of years ago, came before his Honour Judge Parsons, K.C., at the Birkenhead County Court on December 14.

Mr. J. Fraser Harrison, barrister, applied for authority to enable the liquidator of the company (Mr. F. M. W. Wilson, Cook Street, Liverpool) to sue as for a contract debt for the amounts of unpaid calls in arrears, together with interest, for the purpose of paying the general creditors of the company the admitted amounts of their respective debts.

The company, it was mentioned, was wound up this year, and the unpaid calls, with interest, amounted to £5,633 10s. 9d. The syndicate was incorporated in 1919 with a nominal capital of £10,000, divided into 40,000 shares of 5s. each. There was a sum of upwards of £4,000 uncalled capital due in respect of the issued shares.

Mr. T. G. Henningham, representing a number of the contributaries, said his clients had no desire to hinder the liquidator. When the resolution to wind up the company was passed his clients thought it was with a view to reconstruction. No money had been received by his clients, and the whole of the expenses had been paid out of capital. The object of the company was to run airships for civil purposes. It had a landing place in Birkenhead, he believed, for flights to America. It was intimated by Mr. Henningham that some of his clients had paid the first and second, and even the third and fourth calls. He suggested if an order were made empowering the liquidator to sue those who had not so paid there would be no need for further action.

The liquidator's application was granted.

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### SIDE-WINDS

WILL our readers kindly note that the British Emaillite Co., Ltd., no longer have offices at 30, Regent Street, London, S.W. 1—where they have resided for so many years—but that all business is now carried out at 5, Hythe Road, Willesden, N.W. 10, and all communications should be addressed to this address?

— In these days of comparative quietness in the aviation world, it is a matter of considerable satisfaction to be able to record that at least one firm has found it necessary to expand their works in order to cope with the demand for machines. We are referring to the De Havilland Aircraft Co., Ltd., of Stag Lane, Edgware, who are at present busily engaged upon levelling the ground and generally making preparations for laying the foundations for extensions of the old works. This firm has a number of orders on hand, and as the old works were not considered sufficient to deal with the orders sufficiently rapidly, new buildings are to be erected. As the work of constructing the steel buildings is in the able hands of Messrs. A. Dawney and Son, of Battersea, it may be expected that progress will be rapid, and the new works at Stag Lane should soon begin to take shape.

MESSRS. BARIMAR, LTD., of 10, Poland Street, London, W. 1, have just issued a new folder dealing with their Metallurgical (Patented) Process for repairing motor and motor-cycle cylinders and defective castings. This process enables scored cylinders to be repaired at low cost and in a very short time (about two days is the average), while very often castings which are found to be defective owing to blow-holes can be saved from the scrap-heap and made as good as the most perfect casting. A copy of the folder will be sent to anyone interested on receipt of a post-card to above address.

A CHANGE of address is to be noted in the case of E. R. Calthrop's Aerial Patents, Ltd., who have removed from Eldon Street House to 423a, Edgware Road, London, W.2. The new telephone number is Paddington 6332. All enquiries should be addressed accordingly.

WITH the closing down of the Austin aircraft department, a number of technical experts had to seek other employment. It is gratifying to be able to record that these have not all been lost to the aircraft industry. Mr. Kenworthy, the chief designer of Austin aircraft, has, we understand, joined the staff of George Parnall and Co., of Coliseum Works, Bristol, while Mr. Vickers is now turning his attention to aero engine work at Napier's.

### IMPORTS AND EXPORTS, 1920-1921

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; and for 1920, see "FLIGHT" for January 13, 1921.

	Imports		Exports		Re-Exportation	
	1920.	1921.	1920.	1921.	1920.	1921.
Jan. ...	£ 2,323	£ 4,459	£ 32,752	£ 87,128	£ 697	£ 2,285
Feb. ...	9,320	2,379	68,932	59,829	—	19
Mar. ...	2,092	14	67,600	118,199	—	1,565
April...	5,918	1,370	148,484	138,983	—	450
May ...	761,425	3,350	237,627	59,624	400	1,818
June ...	491	5,181	300,572	79,713	61,150	—
July ...	51,020	540	286,646	530,628	—	850
August	116	343	130,774	111,595	2,544	—
Sept.	386	620	302,802	145,755	—	—
Oct. ...	445	4,256	106,954	101,567	913	580
Nov....	9	504	165,607	144,073	—	20
	833,545	23,016	1,848,750	1,577,094	65,704	7,597

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### The London Aero Models Association

THERE were twenty-four members present at the meeting held on December 15. A paper, written by Mr. H. A. B. Fryer, a member residing in Yorkshire, was read, and provoked a very keen discussion. At the conclusion, Mr. Rippon was requested to communicate with him on the various points raised during the debate, and to express the appreciation of the members.

Mr. Paveley gave a very interesting lecture on Ornithopters, having brought a wing to describe the experiments which he had undertaken, also a pair of owls' wings to demonstrate the theory of ornithopters. He also brought data on the various loadings of wings of different birds. A very lively discussion followed, and everyone present thoroughly enjoyed the debate.

Meetings will be held every Thursday at 20, Great Windmill Street, Piccadilly, W. 1, at 7.30 p.m., prompt. Total membership to date 45. Membership forms can be had from the Hon. Sec., Mr. A. E. Jones, of 48, Narcissus Road, West Hampstead, N.W. 6.

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### NEW COMPANIES REGISTERED

INSTONE AIR LINE, LTD., 53, Leadenhall Street, E.C.—Capital £50,000 in £1 shares. Acquiring from S. Instone and Co., Ltd., the undertaking and goodwill of the Instone Air Line. Permanent directors: Sir Samuel Instone, T. Instone, A. Instone and M. P. Davis. Secretary: C. H. Benwick.

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xvi).

### NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

## FLIGHT

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12 " " " " " " " " " "	30	4	12 " " " " " " " " " "	33	0

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\* European subscriptions must be remitted in British currency.

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